

What is claimed is:

1 1. A method of making an electrical structure, comprising:  
2 preparing a database;  
3 placing a substrate in a first laser processing system, the substrate  
4 comprising an electrically insulating material and a first blanket layer of conductive  
5 material disposed on a first surface thereof;  
6 forming at least one fiducial by laser etching;  
7 removing portions of the conductive material by laser etching so as to form  
8 isolated conductive traces;  
9 laser etching at least one alignment hole suitable for receiving therethrough at  
10 least one alignment pin;  
11 laser etching at least one folding line; and  
12 singulating the electrical structure;  
13 wherein forming the at least one fiducial, removing portions of the conductive  
14 material; etching the at least one alignment hole; etching at least one folding line;  
15 and singulating the electrical structure are all performed within the first laser  
16 processing system.

1 2. The method of Claim 1, wherein forming the at least one fiducial, removing  
2 portions of the conductive material; cutting the at least one alignment hole; cutting at  
3 least one folding line; and singulating the electrical structure are all performed within

4 the first laser processing system without removing the substrate from the laser  
5 processing system until the singulation operation is complete.

1 3. The method of Claim 1, wherein the conductive material comprises copper.

1 4. The method of Claim 1, wherein forming at least one fiducial comprises  
2 removing portions of the conductive material.

1 5. The method of Claim 4, wherein forming at least one fiducial further  
2 comprises removing portions of the substrate.

1 6. The method of Claim 1, wherein the database is communicatively coupled to  
2 the laser processing system so as to provide control signals that direct at least a  
3 portion of a plurality of operations of the laser processing system to the laser  
4 processing system.

1 7. The method of Claim 5, wherein the electrical structure is a space  
2 transformer.

1 8. The method of Claim 5, wherein the substrate comprises a material selected  
2 from the group consisting of FR-4, epoxy, and polyimide.

1 9. The method of Claim 5, wherein the substrate comprises a board suitable as  
2 a printed circuit board.

1 10. The method of Claim 5, wherein the substrate comprises a flexible material  
2 suitable for flex circuits.

1 11. The method of Claim 6, wherein a second layer of conductive material is  
2 disposed on a second surface of the substrate.

1 12. The method of Claim 6, wherein the substrate comprises at least one  
2 conductive trace formed therein.

1 13. The method of Claim 6, wherein the singulated electrical structure is a single-  
2 chip package.

1 14. The method of Claim 6, wherein the singulated electrical structure is a multi-  
2 chip package.

1 15. The method of Claim 3, further comprising removing a portion of a passivation  
2 layer disposed the copper, wherein the copper underlying the removed portion of the  
3 passivation layer remains substantially unremoved.

1 16. A method of making an electrical structure, comprising:  
2 providing an insulating substrate having a first major surface and a second  
3 major surface opposite the first major surface, with a layer of metal disposed on the  
4 first major surface; and  
5 removing, by laser etching, at least one portion of the layer of metal so as to  
6 form at least one trace and at least one space adjacent thereto;  
7 wherein the at least one trace has a height, a width, and a first aspect ratio  
8 (height/width); and the at least one space has a height, a width, and a second  
9 aspect ratio (height/width), and wherein the second aspect ratio is greater than the  
10 first aspect ratio.

1 17. The method of Claim 16, wherein the trace comprises copper, and the height  
2 of the conductive trace is in the range of 9 to 72 microns.

1 18. The method of Claim 17, wherein the second aspect ratio is in the range of  
2 0.75 to 50.

1 19. The method of Claim 18, wherein the laser etching is performed in a first laser  
2 etching system, further comprising forming at least one fiducial, and at least one  
3 alignment hole, without removing the substrate from the first laser etching system,  
4 and without realigning the substrate within the first laser etching system.

1 20. The method of Claim 19, further comprising forming at least one bar code,  
2 without removing the substrate from the first laser etching system, and without  
3 realigning the substrate within the first laser etching system.

1 21. The method of Claim 20, further comprising forming at least one folding line,  
2 without removing the substrate from the first laser etching system, and without  
3 realigning the substrate within the first laser etching system.

1 22. The method of Claim 19, further comprising forming at least one passivation  
2 opening.

1 23. A method of forming a space transformer, comprising:  
2 placing a substrate with a first major surface and a second major surface, the  
3 substrate comprising an electrically insulating material, and a first layer of material  
4 disposed on the first major surface, into a first pulsed laser etching system;  
5 etching, with the first pulsed laser etching system, portions of the first layer  
6 and portions of the substrate to form at least one fiducial;  
7 without removing the substrate from the first pulsed laser etching system,  
8 etching portions of the first layer to form conductive traces separated by spaces;  
9 without removing the substrate from the first pulsed laser etching system,  
10 etching portions of the first layer and the substrate to form alignment holes;

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11 without removing the substrate from the first pulsed laser etching system,  
12 laser etching folding lines; and  
13 without removing the substrate from the first pulsed laser etching system,  
14 etching portions to singulate the space transformer;  
15 wherein the width of the spaces is less than the width of the conductive  
16 traces.

1 24. The method of Claim 23, further comprising the first laser etching system  
2 receiving control information from a database, wherein the control information directs  
3 at least a portion of the etching by the first pulsed laser etching system with respect  
4 to the coordinates of a material to be etched.

1 25. The method of Claim 24, wherein the coordinates of the material to be etched  
2 are selected from a single coordinate system, independent of the feature formed by  
3 the etching.

1 26. The method of Claim 23, wherein etching comprises:  
2 exposing a first portion of the first material to a first laser pulse, the first  
3 portion determined by a first set of coordinates of a first coordinate system;  
4 exposing a second portion of the first material to a second laser pulse, the  
5 second portion determined by a second set of coordinates of the first coordinate  
6 system; and

7 exposing a third portion of the first material to a third laser pulse, the third  
8 portion determined by the first set of coordinates of the first coordinate system.

1 27. The method of Claim 23, wherein exposing the first portion to the third laser  
2 pulse occurs subsequent to exposing the second portion to the second laser pulse.

1 28. The method of Claim 23, wherein exposing the first portion to the third laser  
2 pulse occurs prior to exposing the second portion to the second laser pulse.

1 29. The method of Claim 23, wherein etching comprises:  
2 exposing a first coordinate position of the first material to a first laser pulse;  
3 exposing a second coordinate position of the first material to a second laser  
4 pulse; and  
5 exposing at least a portion of a third coordinate position of the first material to  
6 a third laser pulse.

1 30. The method of 29, wherein exposing the at least a portion of the first  
2 coordinate position of the first material to the third laser pulse occurs subsequent to  
3 exposing the second coordinate position of the first material to the second laser  
4 pulse.

1 31. The method of Claim 29, wherein exposing the at least a portion of the first  
2 coordinate position of the first material to the third laser pulse occurs prior to  
3 exposing the second coordinate position of the first material to the second laser  
4 pulse.

1 32. The method of Claim 25, further comprising forming, by laser etching, at least  
2 one graphical symbol from the first layer of material.

1 33. The method of Claim 31, wherein the at least one graphical symbol is a bar  
2 code.

1 34. The method of Claim 25, further comprising removing at least one portion of  
2 an adhesive layer, the adhesive layer disposed between the first material and the  
3 substrate, the at least one portion corresponding to a region defined by an overlying  
4 space, wherein removing the at least one portion of the adhesive layer is performed  
5 without removing the substrate from the first laser etching system, and without  
6 realignment of the substrate.